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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/020,135	12/18/2001	Tzu Hsien Sang	56162.000360	7327

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EXAMINER	
AGHDAM, FRESHTEH N	

ART UNIT	PAPER NUMBER
2631	

DATE MAILED: 03/10/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/020,135	SANG ET AL.	
	Examiner	Art Unit	
	Freshteh N. Aghdam	2631	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 December 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20,22 and 24-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20,22 and 24-26* is/are rejected.

7)☐ Claim(s) *21 and 23* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on _____ is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 3, and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Doron (US Patent 6,778,599), and further in view of Duttweiler (US Patent 5,566,167) and Hasegawa (US Patent 5,905,717).

As to claims 1, 3, 11, and 13, Doron teaches an echo canceller comprising an adaptive FIR filter 204 that receives a transmit signal to generate a signal representative of an echo signal associated with the transmit signal and an interpolation filter 208 to receive and filter the representative signal wherein the filtered output is subtracted from the receive signal outputted from the analog front-end 28 to generate a residual echo error signal (Fig. 3 and 6; Col. 7, Lines 44-48; Col. 9, Lines 1-20). Doron does not teach the interpolation filter having a plurality of branches and the residual echo error signal being in a vector form. Duttweiler, in the same field of endeavor, teaches an echo canceller device with a plurality of sub-bands transmit signals x(k) that are coupled to echo cancellers 107-0 to 107-m-1 and further coupled to subtractors 109-0 to 109-m-1 to generate the residual echo error vectors at the output of the unit 112 wherein the

plurality of error vectors corresponds to the receive signal vector y(k) (Fig. 1; Fig. 5; Col. 2, Lines 25-35 and Lines 49-56). Therefore, it would have been obvious to one of ordinary skill in the art to combine the teaching of Duttweiler with Doron in order to insure that there is sufficient energy in the tap delay lines of the adaptive filters in the sub-band echo cancellers at all frequencies where echoes are to be synthesized (Abstract). Doron doesn't teach the adaptive filters to work at the transmit rate. Hasegawa, in the same field of endeavor, teaches an echo canceller that includes a transmit buffer for converting the rate of the packet signal (i.e. the transmit signal) to a pre-selected rate (Col. 2, Lines 26-32). Therefore, it would have been obvious to one of ordinary skill in the art to combine the teaching of Hasegawa with Doron and Duttweiler in order to have a reasonable speed computation capability to make the implementation of the hardware of an echo canceller easier (Col. 1, Lines 15-17).

As to claims 2 and 12, Duttweiler teaches an error weighting multi-input-multi-output filter 501 having an input adapted to receive the residual echo vector and generating a weighted error vector for training the adaptive echo canceller filter (Fig. 4; Fig. 5, Col. 4, Lines 9-13). Therefore, it would have been obvious to one of ordinary skill in the art to combine the teaching of Duttweiler with Doron and Hasegawa in order to insure that there is sufficient energy in the tap delay lines of the adaptive filters in the sub-band echo cancellers at all frequencies where echoes are to be synthesized (Abstract).

As to claims 4 and 14, Doron teaches a training sequence selected by the interpolation filter 220 wherein the training sequence is transmitted to a receiver from a

transmitter (Fig. 6; Col. 9, Lines 5-8 and Lines 45-50). Therefore, it would have been obvious to one of ordinary skill in the art to apply the teaching of Doron in order to ensure that the filter coefficients begin at the correct values including the interpolation effects of the coefficients (Col. 9, Lines 53-56).

As to claims 5 and 15, Duttweiler teaches a vectorization unit 105 having an input signal y(k) coming from an analog front-end and generating the receive signal vectors y0(k) to ym-1(k) (Fig. 1; Col. 2, Lines 26-30). Therefore, it would have been obvious to one of ordinary skill in the art to combine the teaching of Duttweiler with Doron and Hasegawa in order to insure that there is sufficient energy in the tap delay lines of the adaptive filters in the sub-band echo cancellers at all frequencies where echoes are to be synthesized (Abstract).

As to claims 8 and 18, Hasegawa teaches an echo canceller that includes the buffer 4 for converting the rate of the error signal to a pre-selected rate (Fig. 1; Col. 2, Lines 26-32). Therefore, it would have been obvious to one of ordinary skill in the art to combine the teaching of Hasegawa with Doron and Duttweiler in order to have a reasonable speed computation capability to make the implementation of the hardware of an echo canceller easier (Col. 1, Lines 15-17).

As to claims 9 and 19, Hasegawa teaches an echo canceller that includes a transmit buffer for converting the rate of the packet signal (i.e. the transmit signal) to a pre-selected rate before entering the adaptive filter 3 (Fig. 1; Col. 2, Lines 26-32).

As to claims 10 and 20, Doron teaches a training sequence selected by the interpolation filter 220 wherein the training sequence is transmitted to a receiver from a

transmitter in order to updates the weighting coefficients of the adaptive filter 32 by taking the result of the residual error vector 210 into the account (Fig. 6; Col. 9, Lines 5-8 and Lines 45-50).

Claims 6, 7, 16, and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Doron, Duttweiler, and Hasegawa, and further in view of Gritton et al (US Patent 5,857,167),

As to claims 6 and 16, Doron, Duttweiler, and Hasegawa teach all the subject matters claimed above, except for the vectorization unit comprising at least one delay unit for delaying the input signal by a predetermined number of samples. Gritton et al, in the same field of endeavor, teach a vectorization unit having delay registers (Col. 2, Lines 40-50). Therefore, it would have been obvious to one of ordinary skill in the art to combine the teaching of Gritton with Doron, Duttweiler, and Hasegawa in order to store synthesized receive-input signals corresponding to each of the excitation vectors (Col. 2, Lines 48 and 49).

As to claims 7 and 17, Duttweiler teaches a vectorization unit 105 that further comprises a plurality of down-sampling units 110-0 to 110-m-1.

Claims 22 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Doron, Duttweiler, and Hasegawa, further in view of John M. Croffi (A data-driven multitone echo canceller, 1994 IEEE).

As to claims 22 and 24, Doron, Duttweiler, and Hasegawa teach all the subject matters claimed above, except for the least mean square update rule is applied to train at least one coefficient of the echo canceller filter and is defined as it is cited in the

claims. Croffi teaches a least mean square update rule is applied to train at least one coefficient of the echo canceller filter see equation 30 (Pg. 2856).

As to claims 25 and 26, one of ordinary skill in the art would clearly recognize that when a steady state is reached the signal is sent out.

Allowable Subject Matter

Claims 21 and 23 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

As to claims 21 and 23, the prior art of record fails to teach the equations cited in the claims.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Freshteh N. Aghdam whose telephone number is (571) 272-6037. The examiner can normally be reached on Monday through Friday 9:00-5:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammad Ghayour can be reached on (571) 272-3021. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Freshteh Aghdam

February 22, 2005

MOHAMMED GHAYOUR
SUPERVISORY PATENT EXAMINER

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